FINAL

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR THE MAIN BASE WASTEWATER TREATMENT FACILITY AT EDWARDS AIR FORCE BASE, CALIFORNIA

July 2005

95th Air Base Wing
Civil Engineer Directorate
Environmental Management Division
Edwards AFB, CA

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14. ABSTRACT
This report presents the results of a supplemental environmental assessment conducted pursuant to the Environmental Impact Analysis Process (EIAP) for a proposed project as set forth in Title 32 Code of Federal Regulations Part 989, *Environmental Impact Analysis Process*, which implements the *National Environmental Policy Act of 1969*; Council on Environmental Quality regulations; Department of Defense Instruction 4715.9, *Environmental Planning and Analysis*, 3 May 1996; and Air Force Policy Directive 32-70, *Environmental Quality*, 20 July 1994. The supplemental assessment was completed at the request of the 452nd Flight Test Squadron, Edwards AFB, California, and conducted by JT3/CH2M HILL to evaluate the environmental effects of discharging nonhazardous industrial wastewater directly into the evaporation ponds at the Main Base Wastewater Treatment Plant (WWTP). The assessment was conducted from 18 January to 15 July 2005.

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Prepared by:

JT3/CH2M HILL
FLIGHT TEST SUPPORT CENTER

For:
95th Air Base Wing
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FINDING OF NO SIGNIFICANT IMPACT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR THE MAIN BASE WASTEWATER TREATMENT FACILITY, EDWARDS AIR FORCE BASE, CALIFORNIA

1.0 INTRODUCTION

The construction and operation of the Main Base Wastewater Treatment Plant (WWTP) was previously evaluated in an environmental assessment (EA) (*Environmental Assessment for the Main Base Wastewater Treatment Facility, Edwards AFB, California,* 1994) that resulted in a Finding of No Practicable Alternative (FONPA) and a Finding of No Significant Impact (FONSI) in 1994. The WWTP maintains total dissolved solid (TDS) concentrations between 650 to 860 milligrams per liter (mg/L) in the treatment process to reuse the wastewater for landscape irrigation. In addition, the biological oxygen demand (BOD) levels are maintained to ensure the proper function of microbiological communities. Guidelines for wastewater treatment are established by the WWTP to maintain the required concentration levels of TDS and BOD.

1.1 Background

Various test and development programs arrive at Edwards Air Force Base (AFB) and utilize the WWTP to dispose of their nonhazardous industrial wastewater. Periodically, the wastestreams exceed the TDS and BOD guidelines established by the WWTP, resulting in the suspension of wastewater discharges to the WWTP. An alternate disposal method was evaluated that would discharge the nonhazardous industrial wastewater directly into the evaporation ponds. This alternate method of disposal was not previously evaluated in the EA and represents the proposed action for this Supplemental EA.

An assessment of the potential environmental consequences of the proposed action and the no action alternative was conducted pursuant to the Environmental Impact Analysis Process (EIAP) for a proposed project as set forth in Title 32 Code of Federal Regulations (CFR) Part 989, *Environmental Impact Analysis Process*, which implements the *National Environmental Policy Act of 1969* (NEPA); Council on Environmental Quality (CEQ) regulations; Department of Defense (DOD) Instruction 4715.9, *Environmental Planning and Analysis*, 3 May 1996; and Air Force Policy Directive 32-70, *Environmental Quality*, 20 July 1994.

1.2 Purpose and Need

The purpose of this assessment was to evaluate the environmental effects of discharging nonhazardous industrial wastewater directly into the evaporation ponds. The wastewater is generated by various test and development programs and often contains concentrations that exceed the operational guidelines of the WWTP. Whenever guidelines are exceeded, wastewater discharges to the WWTP are suspended. To ensure wastewater effluent is discharged on a continuous basis to the benefit of the test programs, the direct discharge into the evaporation ponds was examined as a viable alternative.

2.0 SUMMARY OF ENVIRONMENTAL EFFECTS

Implementing this alternate disposal method is not expected to significantly alter the productivity of the environment. However, the effects to migratory birds may be potentially impacted by the implementation of the proposed action. Environmental effects to other resources were evaluated in the EA and would not be affected by the proposed action. Therefore, these resources are not discussed in this Supplemental EA. These resources include: land use, air quality, hazardous substances, health and safety, cultural and geological resources, infrastructure, socioeconomic, energy resources, and environmental justice.

2.1 Migratory Birds

The number of migratory birds that inhabit the evaporation ponds during the fall and winter months is not expected to differ from the estimates reported in the EA (AFFTC 1994). With the number of migratory birds inhabiting the pond area, bird deaths would be anticipated. Although bird mortality occurs everywhere, it would be most noticeable in areas of minimal groundcover like those areas surrounding the evaporation ponds. Observations of the evaporation ponds during maintenance checks have not indicated bird mortality reaching noticeable levels during either the fall, winter, or summer months. Bird mortality would remain part of the environmental condition in the pond area and will continue to be part of the future condition.

The volume of wastewater discharge from test programs would be variable and could be as high as 100,000 gallons per month. During the winter months this volume would be mixed with discharges from the WWTP amounting to 600,000 to 700,000 gallons per day. The volume from the test programs would not add significantly to the surface water impoundment currently in the ponds. Since the surface impoundment area would not increase beyond the current five-pond area, it is anticipated the migratory bird population would not increase beyond that reported in the EA. During the summer months, the bird populations would be reduced significantly due to the reduced area of wastewater impoundment.

The wastewater generated by test programs and the WWTP would increase the salinity of the evaporation ponds. Based on the combined discharge rates and TDS concentrations, the salinity of the wastewater impoundment would be about 1,200 mg/L, slightly above brackish water. A comparison of salinities in the pond area with other saline basins in the region that are important migratory bird stops indicate that the size of the bird population is more a function of the available impoundment area rather than salinity concentrations.

Calculations were also made of the salinity of the wastewater impoundment in the ponds. It was determined that salt would be deposited in the ponds at the rate of 0.01 to 0.02 inches per year. This rate of salt accumulation suggests that the environmental condition of the ponds would not be significantly altered by the wastewater discharges and that bird habitats would not be impacted by salinity concentrations.

3.0 FINDINGS

A Finding of No Significant Impact (FONSI) to the environment was determined after evaluating the potential effects of the proposed action, the discharge of nonhazardous industrial wastewater directly into the evaporation ponds at the Main Base WWTP. This determination is based on the evaluation of the environmental resources that may be affected by the proposed action, and the environmental consequences that may result if the proposed action was implemented. Background information in support of the FONSI is presented in the Supplemental EA and is on file at Edwards AFB and can be obtained by contacting:

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Attn: Mr. Gary Hatch
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15 July 05
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FINAL

COVER SHEET

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR THE MAIN BASE WASTEWATER TREATMENT FACILITY, EDWARDS AIR FORCE BASE, CALIFORNIA

a. Lead Agency: U.S. Air Force

b. Cooperating Agency: None

c. Proposed Action: The direct discharge of nonhazardous industrial wastewater into the evaporation ponds at the Main Base Wastewater Treatment Plant (WWTP)

d. Inquiries on this document should be directed to the 95th Air Base Wing, Civil Engineer Directorate, Environmental Management Division (95 ABW/CEV), Attn: Gary Hatch, 5 East Popson Avenue, Building 2650A, Edwards Air Force Base, California 93524-8060, (661) 277-1454 or e-mail: gary.hatch@edwards.af.mil.

e. Designation: Draft Final Supplemental Environmental Assessment (SEA)

f. Abstract: Pursuant to the *National Environmental Policy Act of 1969*, this SEA has been prepared to analyze the potential environmental consequences of the proposed action. The proposed project would discharge nonhazardous industrial wastewater directly into the evaporation ponds at the WWTP. The analysis in this SEA indicates that none of the environmental impacts from the proposed action would be significant if the required or recommended minimization measures are followed.

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LIST OF ABBREVIATIONS AND ACRONYMS

95 ABW/CEV	95th Air Base Wing, Civil Engineer Directorate, Environmental Management Division
AF	Air Force
AFB	Air Force Base
AFFTC	Air Force Flight Test Center
AFFTCI	Air Force Flight Test Center Instruction
BOD	biological oxygen demand
bgs	belowground surface
CRWQCB	California Regional Water Quality Control Board
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cm/sec	centimeters per second
DOD	Department of Defense
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
FONSI	Finding of No Significant Impact
FONPA	Finding of No Practicable Alternative
gpd	gallons per day
LRWQCB	Lahontan Regional Water Quality Control Board
MBTA	Migratory Bird Treaty Act
mgd	million gallons per day
mg/L	milligrams per liter
NEPA	National Environmental Policy Act of 1969
ppm	parts per million
TDS	total dissolved solid
USC	United States Code
WWTP	wastewater treatment plant

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1.0 INTRODUCTION

The Main Base Wastewater Treatment Plant (WWTP) Environmental Assessment (EA) was completed and a Finding of No Significant Impact (FONSI) and a Finding of No Practicable Alternative (FONPA) was signed August 1994 (Air Force Flight Test Center [AFFTC] 1994). Three alternatives were considered in the analysis and Alternative A, the construction of a tertiary treatment plant utilizing the excess effluent flow from the WWTP for landscape irrigation during the summer months and discharging excess effluent flow into the evaporation ponds during the winter months was proposed. According to the EA, the WWTP treats both sanitary and industrial wastestreams from basewide facilities and controls total dissolved solid (TDS) concentrations for wastewater reuse and biologic oxygen demand (BOD) levels for maintenance of microorganism communities. The disposal of nonhazardous industrial wastewater directly to the evaporation ponds was not a method of disposal considered in the Main Base WWTP EA. The direct disposal to the evaporation ponds and bypassing the WWTP is a new alternative disposal method that is being evaluated in this supplemental EA.

1.1 Background

Since the construction of the WWTP, Edwards Air Force Base (AFB), California, has been the site of various test and development programs that have utilized the WWTP to dispose of their nonhazardous industrial wastewater. Periodically, the concentration of wastestreams from the test programs have exceeded the guidelines and/or operating parameters established by the WWTP, resulting in the suspension of wastewater discharges from the test programs.

The WWTP maintains TDS concentrations between 650 to 860 milligrams per liter (mg/L) in the treatment process for purposes of reusing the wastewater in landscape irrigation. In addition, BOD levels are maintained to ensure the proper function of microbiological communities. Guidelines for wastewater treatment are established by the WWTP to maintain the required concentration levels of TDS and BOD.

1.2 Purpose and Need

The purpose of this Supplemental EA is to evaluate the environmental effects of discharging nonhazardous industrial wastewater directly into the evaporation ponds. This wastewater is generated by various test and development programs and often contains concentrations that exceed the operational guidelines of the WWTP. Whenever guidelines are exceeded, wastewater discharges to the WWTP are suspended. To ensure wastewater effluent is discharged on a continuous basis for the benefit of the test programs, the direct discharge into the evaporation ponds is being examined as a viable alternative.

1.3 Location and Scope of the Proposed Action

Edwards AFB is located in the Antelope Valley region of the western Mojave Desert in southern California. It is about 60 miles northeast of Los Angeles, California. The base occupies an area of approximately 301,000 acres or 470 square miles. Portions of the base lie within Kern, Los Angeles, and San Bernardino counties (figure 1). The WWTP is located in Kern County.

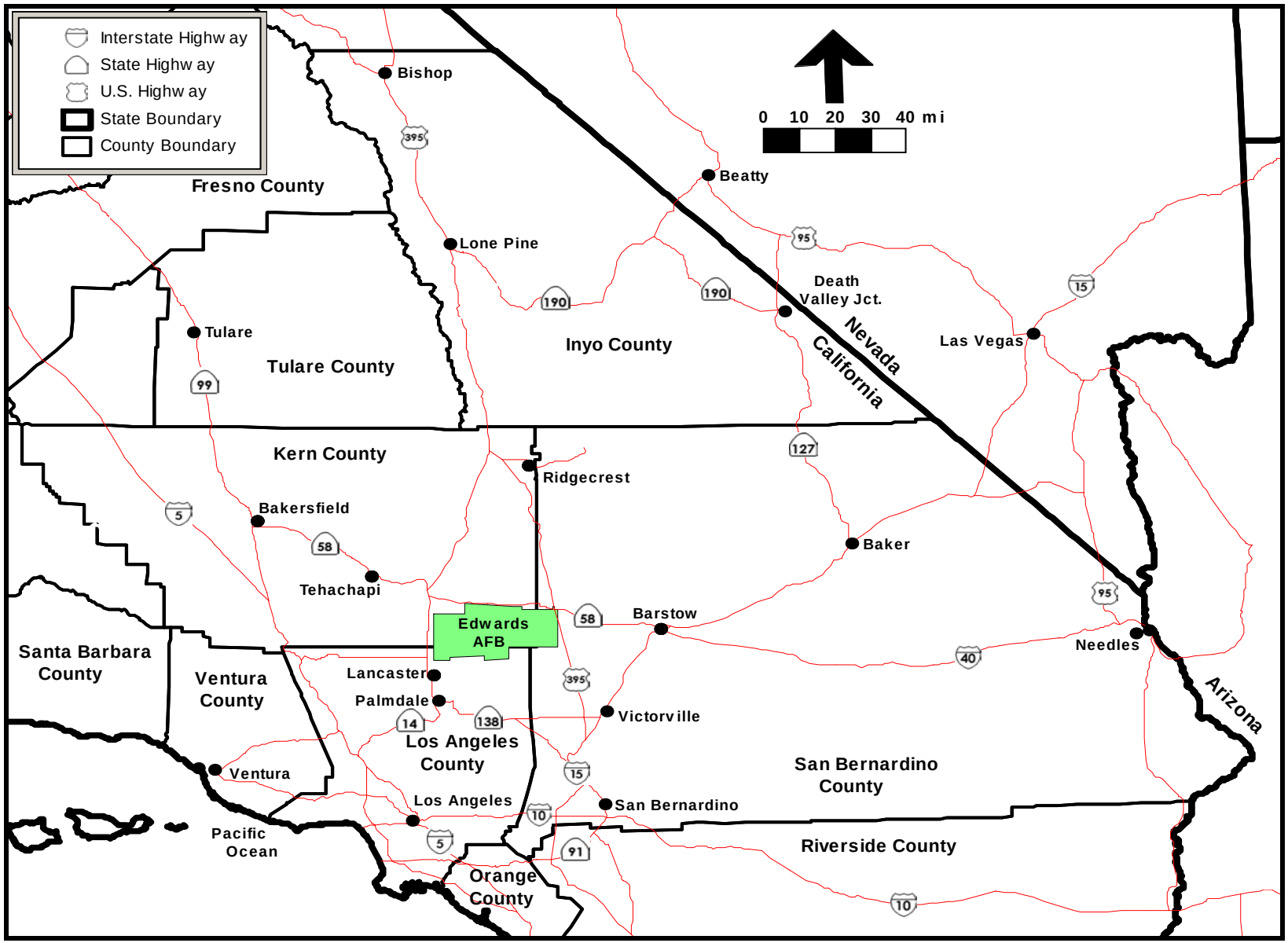

Figure 1. General Vicinity Map

1.4 Issues and Concerns

Environmental resources such as land use, air quality, hazardous substances, health and safety, cultural and geological resources, infrastructure, and socioeconomic issues were addressed in the *Environmental Assessment for the Main Base Wastewater Treatment Facility at Edwards AFB, California* (AFFTC 1994), and found not to impact the environment. During the scoping process to determine the effects of the alternate disposal method, it was determined that most of the environmental resources would remain unchanged and not differ from those found in the EA. The exception is the potential effect on migratory birds and groundwater.

a. Migratory Birds – Additional surface water would occur in the evaporation ponds during the winter months, possibly extending the use by migratory birds. Variable concentrations of TDS in the wastewater would occur and may affect migratory bird habitats.

b. Groundwater – The impoundment of wastewater directly into the ponds would not impact the groundwater aquifers either locally or regionally. Perched groundwater occurs in various areas of the pond at about 35 feet belowground surface (bgs), while the potable groundwater aquifer occurs at about 100 feet bgs (Boyle 2000) extending into the Rogers Dry Lake region. The vertical coefficient of permeability in the pond sediments was investigated and permeability varied from 2.5×10^{-10} to 4.1×10^{-9} centimeters per second (cm/sec). The coefficient of permeability was within requirements established in the California Regional Water Quality Control Board (CRWQCB), Lahontan District, 2001, Board Order 6-94-52, *Revised Waste Discharge Requirements for U.S. Department of the Air Force, Edwards Air Force Base – Main Base Wastewater Treatment Plant*, indicating subsurface infiltration to the aquifers would not be anticipated.

1.5 Regulatory Requirements

This supplemental EA provides the basis for determining the degree of environmental impacts of the Proposed and Alternative Actions. It is part of the Environmental Impact Analysis Process (EIAP) for a proposed project as set forth in Title 32 Code of Federal Regulations (CFR) Part 989, *Environmental Impact Analysis Process*, which implements the *National Environmental Policy Act of 1969* (NEPA); Council on Environmental Quality (CEQ) regulations, 40 CFR 1500–1508, *National Environmental Policy Act of 1969*; Department of Defense (DOD) Instruction 4715.9, *Environmental Planning and Analysis*, 3 May 1996; and Air Force Policy Directive 32-70, *Environmental Quality*, 20 July 1994.

This supplemental EA identifies, describes, and evaluates potential environmental impacts that may result; and any permits, approvals, and minimization measures that may be required by implementing the Proposed Action or the No Action Alternative. This supplemental EA also includes potential cumulative impacts from all reasonable foreseeable activities at the base when the nonhazardous industrial wastewater is discharged directly into the ponds.

Migratory bird species that inhabit the pond area during the winter months and their active nests and eggs are protected federally by the *Migratory Bird Treaty Act (MBTA) of 1918* (16 United States Code 703–712).

1.6 Permits and Approvals

The proponent performing the work is responsible for obtaining the relevant permits and accomplishing any required notifications. Environmental permitting requirements for all work on base are coordinated through the 95th Air Base Wing, Civil Engineer Directorate, Environmental Management Division (95 ABW/CEV). The following permits would be required in the current regulatory environment. However, as regulatory requirements evolve, other permits may be required.

a. Each test program will require an AFFTC Form 5852, *Permit for Industrial Wastewater Discharge, Edwards AFB, California*, to discharge nonhazardous industrial wastewater to the evaporation ponds with concurrence from Edwards AFB Bioenvironmental Engineering, Civil Engineering, and 95 ABW/CEV.

b. Each test program needing to discharge nonhazardous industrial wastewater directly into the WWTP ponds shall be in compliance with the current State Board Order permit California Regional Water Quality Control Board (CRWQCB), Lahontan District, 2001, Board Order No. 6-01-41, *Revised Waste Discharge Requirements for U.S. Department of the Air Force, Edwards Air Force Base – Main Base Wastewater Treatment Plant,* 13 June). Each additional discharge action may also require approval from the Lahontan Regional Water Quality Control Board (LRWQC) to discharge wastewater effluent.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This section describes the Proposed Action, Alternative A – Discharge of Nonhazardous Industrial Wastewater to the Evaporation Ponds; and Alternative B – No Action Alternative.

2.1 Alternative A – Discharge of Nonhazardous Industrial Wastewater to the Evaporation Ponds (Preferred Alternative)

The nonhazardous industrial wastewater generated by various test programs is often released into the WWTP system. Periodically, the wastewater exceeds the TDS guidelines established by the WWTP, resulting in suspension of wastewater discharge to the WWTP. To ensure that wastewater discharge remains continuous and without disruption to the test programs, the direct discharge into the evaporation ponds is being evaluated as a viable alternative. Wastewater would be transported by tanker trucks to the nearest release point (manhole), downstream of the WWTP, leading to the evaporation ponds and discharged. A view of the WWTP and the evaporation ponds is presented in figure 2.

2.2 Alternative B – No Action Alternative

The no action alternative is to continue using tanker trucks to transport the nonhazardous industrial wastewater generated by test programs to an off-base facility for disposal. There would be no change in impacts to the environment with this alternative.

Note: The Evaporation Ponds are located southeast of the Wastewater Treatment Plant and adjacent to Rogers Dry Lake. The darker shades in the ponds represent wastewater from the Wastewater Treatment Plant. The darker shades in the lakebed represent surface runoff from a recent rain shower.

Figure 2. Location of Evaporation Ponds

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3.0 AFFECTED ENVIRONMENT

The affected environments have been evaluated in the Main Base WWTP EA. This section describes the relevant resource that may be impacted by the action alternative if implemented. This section also establishes the baseline condition which the decision maker can compare to determine the effects of the action alternative. The resource that may be affected due to changing environmental conditions from the action alternative is the biological resource (migratory birds).

3.1 Migratory Birds

The number of migratory birds that inhabit the evaporation ponds during the fall and winter months is not expected to differ from the estimates reported in the EA (AFFTC 1994). Bird species that have been observed in the pond area include, but are not limited to the ruddy duck (*Oxyura jamaicensis*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), mallard (*Anas platyrhynchos*), cinnamon teal (*Anas cyanoptera*), red-necked phalarope (*Phalaropus lobatus*), long-billed dowitcher (*Limnodromus scolopaceus*), least sandpiper (*Calidris minutilla*), and dunlin (*Calidris alpina*) (AFFTC 1994). With the number of migratory birds inhabiting the pond area during the fall and winter, a number of bird deaths would be anticipated. Although bird mortality occurs everywhere, it would be most noticeable in areas of minimal groundcover such as at the evaporation ponds. Observations of the evaporation ponds during maintenance checks have not indicated bird mortality reaching noticeable levels during either the fall, winter, or summer months. Bird mortality would remain part of the environmental condition in the pond area and would continue to be part of the future.

During the fall and winter months, the WWTP discharges excess wastewater effluent into the evaporation ponds at a rate of 600,000 to 700,000 gallons per day (gpd) creating a surface water impoundment covering 250 acres over a five-pond area. During the summer months, the WWTP reuses the wastewater effluent for landscape irrigation and little or no wastewater is diverted to the ponds. The surface water impoundment area is reduced significantly during the summer and is no longer an attraction to migratory birds.

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Biological Resources

4.1.1 Alternative A Impacts (Preferred Alternative)

4.1.1.1 Migratory Birds

The direct discharge of nonhazardous industrial wastewater generated by the test programs would be added and mixed with effluent from the WWTP during the fall and winter months. The volume of wastewater discharged, although variable, could be as high as 100,000 gallons per month (about 3,000 gpd), or an additional increase of about 0.5 percent of the total wastewater discharges from the WWTP. The volume from the test programs would not add significantly to the discharge volumes, therefore, the area of surface water impoundment would not be impacted beyond current levels. Since the surface impoundment area would not be increased, it is anticipated that the migratory bird population would not increase beyond that reported in the EA. During the summer months, there would not be wastewater impoundment due to reuse for landscape irrigation and high evaporation rates in the desert environment.

The combined wastewater discharges from both the test programs and the WWTP would slightly increase the salinity of the evaporation ponds. However, the increased concentration would not be enough to change the water quality in the evaporation ponds. Using discharge rates of 100,000 gallons per month and TDS concentrations of 80,000 pounds of salt per month from the test programs, and 600,000 to 700,000 gpd and TDS concentrations of 96,000 pounds of salt per month from the WWTP, the salinity of the impoundment would be about 1,200 mg/L (Peffer 2005), slightly above brackish water. A comparison of salinities in the pond area was made with other saline basins in the region that are important migratory bird stops. The comparative areas include the Salton Sea, the Great Salt Lake, and the ocean basins (figure 3). Based on this analysis, the size of the bird population is suggested to be more a function of the available impoundment area rather than salinity concentrations.

A salt loading analysis was also made and the rate of salt accumulation in the ponds was calculated to be about 0.01 to 0.02 inches per year (Jones 2005 and Vidic 2004) (Appendix A). The rate of salt accumulation suggests that the environmental condition of the ponds would not be altered much from its current condition and that bird populations and habitats would not be significantly impacted.

4.2 Alternative A Minimization Measures

There are no minimization measures that would be anticipated to control the variable population of migratory birds during the winter months. The population would be affected mainly by the surface area of wastewater impoundment.

4.2.1 Alternative B Impacts

The nonhazardous industrial wastewater generated by various test programs would be transported in tanker trucks to an off-base facility for disposal. There are no changes or new impacts to the migratory bird populations resulting from this alternative.

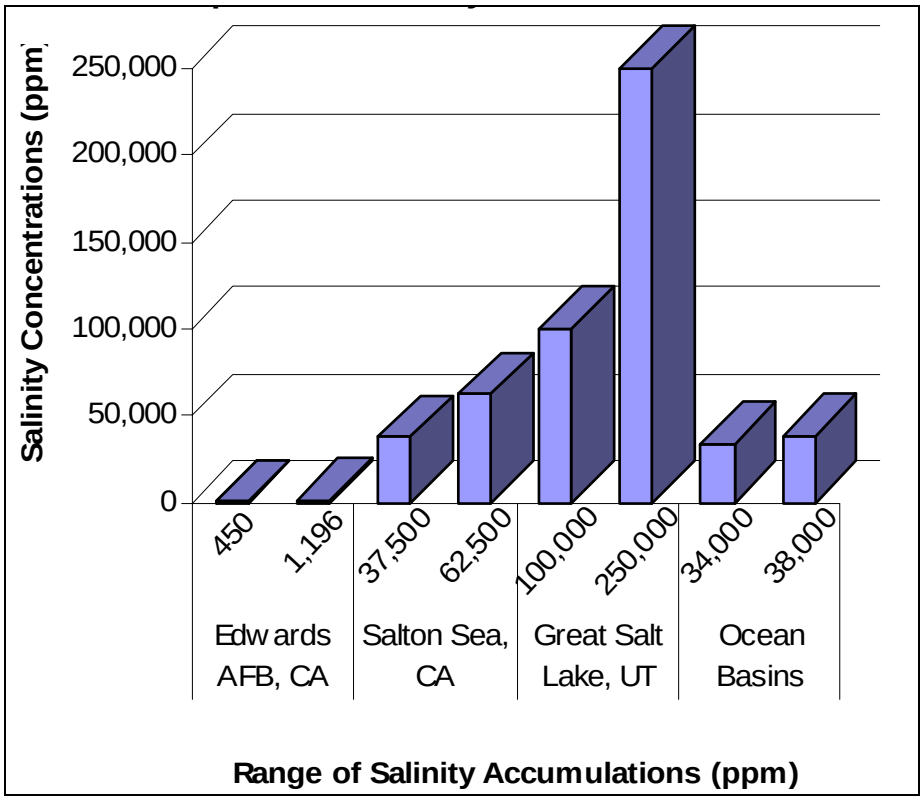

Figure 3. Comparison of Salinity Accumulation Areas

4.2.2 Alternative B Minimization Measures

No minimization measures are required.

4.3 NEPA Mandated Analysis

In addition to the evaluation of potential impacts to environmental resources, other impacts need to be evaluated. These include: cumulative, direct/indirect, short-term/long-term, and unavoidable adverse effects; and irreversible and irretrievable commitment of resources.

4.3.1 Cumulative Effects

The CEQ regulations implementing NEPA require agencies to consider the potential for cumulative impacts of proposed actions. "Cumulative impact" is defined in 40 CFR 1508.7 as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time. "

The WWTP currently discharges about 600,000 to 700,000 gpd of wastewater effluent into the evaporation ponds during the fall and winter months (October to March). During this period, the amount of salt loading in the ponds has been estimated to be about 96,000 pounds per month (Jones 2005 and Vidic 2004). The discharge of wastewater from test programs would be as much as 100,000 gallons per month and would deposit about 60,000 pounds per month of salt. The

cumulative effects of salt loading by the test programs would increase the salinity of the pond area, but the increases would not represent a significant impact.

Salinity concentrations of the wastewater impoundment were made based on the volume of projected wastewater discharges into the ponds. Salinities of about 1,200 mg/L (parts per million) were calculated for the wastewater impoundment. The salinities were compared with other regions with similar salt accumulations and it was determined that the salt accumulations in the ponds were not significant when compared to the Salton Sea, the Great Salt Lake, and the ocean basins (see figure 3). An estimation of annual salt accumulation rate was also calculated using projected wastewater discharges from both the WWTP and test programs. Results indicate that about 0.01 to 0.02 inches of salt per year would be deposited in the ponds. The rate of salt accumulation suggests that the environmental condition of the ponds would remain similar to current conditions and bird populations and habitats would not be significantly impacted.

4.3.2 Direct/Indirect Effects

The nonhazardous industrial wastewater generated by test programs would be discharged into the evaporation ponds together with the wastewater effluent from the WWTP during the fall and winter months. The combined volume of effluent would have a direct effect on the TDS concentrations in the pond area. The projected volumes of wastewater effluent generated by test programs would be as high as 100,000 gallons per month, resulting in salt loading of as much as 60,000 pounds of salt per month. Wastewater discharges from the WWTP would be about 600,000 to 700,000 gpd, resulting in over 96,000 pounds of salt per month. However, when examining the indirect effects of the added TDS concentrations on the pond area, the salinity of the wastewater impoundment would be about 1,200 mg/L, which is slightly above brackish water. The additional effluent from test programs is not anticipated to significantly alter the environmental condition of the ponds.

4.3.3 Short-Term/Long-Term Effects

Excess wastewater effluent from the WWTP is discharged into five evaporation ponds during the winter months creating a surface water impoundment covering 250 acres. The wastewater impoundment is a short-term effect, since the pond areas become dry during the summer months due to high evaporation rates and wastewater reuse for landscape irrigation. Wastewater effluent from test programs would be discharged into the evaporation ponds throughout the year. The long-term effects of the discharges would not exceed the current storage capacity of the ponds. The flow rates would be variable throughout the year and would be as much as 100,000 gallons per month. The average monthly discharge is not considered significant enough to exceed the available storage capacity of the ponds particularly during the summer months.

4.3.4 Unavoidable Adverse Effects

Unavoidable adverse impacts include those that are negative, occurring regardless of any identified minimization measure that would be implemented during the proposed action. There are no unavoidable adverse effects based on this evaluation.

4.3.5 Irreversible and Irretrievable Commitments of Resources

4.3.5.1 Alternative A Impacts (Preferred Alternative)

The direct discharge of nonhazardous industrial wastewater to the evaporation ponds would utilize base resources such as tanker trucks from the Government Services Administration pool. The cost to haul the wastewater constitutes both an irreversible and irretrievable commitment of resources.

4.3.5.2 Alternative B Impacts

Alternative B, the No Action Alternative, is to transport the nonhazardous industrial wastewater to an off-base facility by tanker trucks. The irreversible and irretrievable commitment of resources would include additional capital for hauling the wastewater and disposal charges off base on an as-needed basis.

5.0 REFERENCES

Air Force Flight Test Center (AFFTC), 2000, *Main Base Evaporation Ponds Compliance Study, Edwards Air Force Base, California*.

AFFTC, 1994, *Environmental Assessment for the Main Base Wastewater Treatment Facility at Edwards Air Force Base, California*, August. Document on file at the 95th Air Base Wing, Civil Engineer Directorate, Environmental Management Division (95 ABW/CEV), Edwards AFB, California.

AFFTC Form 5852, *Permit for Industrial Wastewater Discharge, Edwards AFB, California*.

AFFTC Instruction 32-6, *Edwards AFB Wastewater Instruction*, 1 December 1995.

Air Force Policy Directive 32-70, *Environmental Quality*, 20 July 1994.

Boyle Engineering Corporation, 2000, *Main Base Sewage Lagoon Report, Edwards Air Force Base, California*.

Code of Federal Regulations (CFR)

32 CFR 989, *Environmental Impact Analysis Process*
40 CFR 1500–1508, *National Environmental Policy Act of 1969.*

California Water Resources Control Board (CWRCB), Lahontan District, 2001, Board Order 6-94-52, *Revised Waste Discharge Requirements for U. S. Department of the Air Force, Edwards Air Force Base – Main Base Wastewater Treatment Plant*, 13 June.

Department of Defense Instruction 4715.9, *Environmental Planning and Analysis*, 3 May 1996.

Jones, Eric, 2005, TYBRIN, personal communication regarding calculations on salinities and salt loading in the evaporation ponds by test program, January.

Peffer, Eric, 2005, JT3/CH2M HILL, personal communication regarding migratory bird habitats and calculations of various salinity concentrations based on hypothetical test program discharge rates, January.

United States Code (USC)

16 USC 703–712, *Migratory Bird Treaty Act of 1918.*

Vidic, John, 2004, 95 ABW/CEV, personal communication regarding salinity calculations of various test program discharge rates, December.

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6.0 PREPARER/REVIEWERS

The following people were responsible for the preparation or review of the *Supplemental Environmental Baseline Survey for the Main Base Wastewater Treatment Facility, Edwards Air Force Base, California.*

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FINAL

APPENDICES

July 2005

APPENDIX A
SALINITY CALCULATIONS

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Salt To. Ponds with Normal Discharge no ABL

1987 100% Img/day 450 ppm

1996

$$\frac{450 \text{ Lbs salt}}{10^6 \text{ Lbs Soln}} \times \frac{10^6 \text{ gal}}{\text{day}} \times \frac{8.34 \text{ Lbs soln}}{\text{gal}} = \frac{3,753 \text{ Lbs}}{\text{day}}$$

$$\frac{3,753 \text{ Lbs salt}}{\text{day}} \times \frac{365.25 \text{ dy}}{\text{yr}} = \frac{1,371 \text{ m Lbs}}{\text{yr}}$$

$$9 \text{ yr} \times \frac{1.371 \text{ MLbs}}{\text{yr}} = 12.337 \text{ MLbs}$$

1997 - 2004 80-90% recycle → 450 ppm

$$\frac{450 \text{ Lbs salt}}{10^6 \text{ Lbs Soln}} \times \frac{10^6 \text{ gal}}{\text{dy}} \times \frac{8.34 \text{ Lbs soln}}{\text{gal}} = \frac{3753 \text{ Lbs}}{\text{day}}$$

80-90% recycle assume avg 15% to ponds

$$\frac{3753 \text{ Lbs}}{\text{dy}} \times \frac{0.15 \text{ Lbs}}{\text{Lb}} = 562.9 \text{ Lbs/day}$$

$$\frac{562.9 \text{ Lbs}}{\text{dy}} \times \frac{365.25 \text{ dy}}{\text{yr}} = \frac{205,617 \text{ Lbs}}{\text{yr}}$$

$$\frac{205,617 \text{ Lbs}}{\text{yr}} \times 7 \text{ yrs} = 1439,319 \text{ m Lbs}$$

Salt Solids

TDS - 70,000 ppm

Flow rate 100,000 gal / month

S.g. soln 1.08

$$\frac{70{,}000 \text{ lbs } Na_2SO_4}{106 \text{ lbs soln}} \times \frac{100{,}000 \text{ gal soln}}{\text{month}} \times \frac{8.34\ (1.08) \text{ lbs soln}}{\text{gal soln}} \times \frac{12 \text{ month}}{\text{yr}}$$

$$= \frac{756{,}604 \text{ lbs } Na_2SO_4}{\text{yr}}$$

Na_2SO_4 S.G. = 2.67

$$\rho = 8.34 \frac{\text{lbs}}{\text{gal}} \times 2.67 = 22.26 \frac{\text{lb}}{\text{gal}}$$

$$\frac{22.26 \text{ lb}}{\text{gal}} \times \frac{748 \text{ gal}}{\text{ft}^3} = \frac{166.57 \text{ lbs}}{\text{ft}^3}$$

$$\frac{756{,}604 \text{ lbs}}{\text{yr}} \div \frac{\text{lbs}}{166.57 \text{ lbs}} = \frac{4{,}543 \text{ ft}^3}{\text{yr}}$$

$$\frac{4{,}543 \text{ ft}^3}{\text{yr}} \times \frac{}{43{,}560 \text{ ft}^2 (52 \text{ ft})} \times \frac{12 \text{ in}}{\text{ft}} = \frac{.02 \text{ inch}}{\text{yr}}$$

ABL wastewater TDS accumulation calculations

$$\frac{100{,}000\ \text{gal}}{\text{mo}} \times \frac{12\ \text{mo}}{1\ \text{yr}} \times \frac{30{,}000\ \text{mg}}{\text{L}} \times \frac{1\ \text{g}}{1000\ \text{mg}} \times \frac{1\ \text{lb}}{453.5924\ \text{g}} \times \frac{3.785412\ \text{L}}{1\ \text{gal}} = 300{,}435\ \frac{\text{lb}}{\text{yr}}$$

Using a Density of K2SO4 as 2.66:

$$\frac{2.66}{} \times \frac{8.34\ \text{lb}}{\text{gal}} = 22.184\ \frac{\text{lb}}{\text{gal}}$$

1 Acre-foot = 325,852 gal:

$$\frac{300{,}435\ \text{lbs}}{} \times \frac{1\ \text{gal}}{22.184\ \text{lb}} \times \frac{1\ \text{acre-ft}}{325{,}852\ \text{gal}} \times \frac{12\ \text{in}}{1\ \text{ft}} = 0.498736\ \text{acre-inch}$$

$$\frac{0.498736\ \text{acre-in}}{52\ \text{acre}} = 0.01\ \text{inch}$$

Conclusion: **So 0.01 inches/yr will accumulate on a pond of 52 acres**

ABL SALT LOADIN LOADING 80,000 mg/l (TDS) 6 tests/month @ 15,000 gal. (WW)

test/mo	gal/test	gal/mo	l/gal	l/mo	mg/l	mg/mo	kg/106mg	kg/mo	lb/kg	lb/mo Salt	mo/yr	lb/yr Salt
6	15,000	90000	3.785	340,650	80,000	27,252,000,000	1,000,000	27,252	2.2	59,954	6	359,726

WWTP SALT LOADING

da/mo	gal/da	gal/mo	l/gal	l/mo	mg/l	mg/mo	kg/10^6mg	kg/mo	lb/kg	lb/mo Salt	mo/yr	lb/yr Salt
30	600000	18,000,000	3.785	68,130,000	647	44,080,110,000	1,000,000	44,080	2.2	96,976	6	581,857.45

TOTAL SALT LOADING (Mixing ABL/WWTP) 600,000 gal/da (WW) 647 mg/l (TDS)

mg/mo (ABL)	mg/mo (WWTP)	mg/mo (Total salts)	mo/l (Total WW)	mg/l/
27,252,000,000	44,080,110,000	71,332,110,000	68,470,650	1,042

ABL SALT LOADIN LOADING 80,000 mg/l (TDS) 6 tests/month @ 15,000 gal. (WW)

test/mo	gal/test	gal/mo	l/gal	l/mo	mg/l (salt)	mg/mo	kg/10^6mg	kg/mo	lb/kg	lb/mo Salt	mo/yr	lb/yr Salt
6	15,000	100,000	3.785	378,500	100,000	37,850,000,000	1,000,000	37,850	2.2	83,270	6	499,620

WWTP SALT LOADING

da/mo	gal/da	gal/mo	l/gal	l/mo	mg/l (salt)	mg/mo	kg/10^6mg	kg/mo	lb/kg	lb/mo Salt	mo/yr	lb/yr Salt
30	600,000	18,000,000	3.785	68,130,000	647	44,080,110,000	1,000,000	44,080	2.2	96,976	6	581,857.45

TOTAL SALT LOADING (Mixing ABL/WWTP) 600,000 gal/da (WW) 647 mg/l (TDS)

mg/mo (ABL)	mg/mo (WWTP)	mg/mo (Total salts)	mo/l (Total WW)	mg/l
27,252,000,000	44,080,110,000	81,930,110,000	68,508,500	1,196

WW TDS ACCUMULATIONS

lb/yr	lb/gal	gal/ac-ft	in/ft	ac-in/yr	ac in pond	in/yr
499,620	22.1844	325852	12	0.8293789	52	0.015949594

DENSITY OF K2SO4

	lb/gal	lb/gal
2.66	8.34	22.1844